

# Work Order ID-55374

January 14, 2010 2:39:34 PM

Page 1

Item ID: D350-748-241TRN

Accept

Setup Start

Revision ID:

Stop

Item Name: Crossstube Turning Detail

Start Date: 1/14/10 - Start Qty: 1.00

Cust Item ID:

Required Date: 1/21/10 - Req'd Qty: 1.00

Customer:

Reference:

Run Start

Approvals: Process Plan: *PL*

Date: 10-1-14

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	----------------	--------------	--------------	---------------	---------------	------------------	----------------

Draw Nbr

Revision Nbr

D350-748-241

Rev E

100

0.00



Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA647  
2-Turn first side as per Folio FA647  
3- File transition lines smooth.

*amb/NB/* *AK* *MB 10-02-10*

110

0.00



QC

QC1- Inspect dimensions to dimension sheet

Memo

0.00

Quality Control

*MB* *AK* *MB 10-02-10*

120

0.00



Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA647  
2- File transition lines smooth.  
3-Scribe part # as per Dwg D350-748-241

*amb/NB/* *AK* *MB 10-02-10*

*Batch #*

*10/02/09*

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Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130  QC Quality Control	QC1- Inspect dimensions to dimension sheet  Memo	0.00  0.00				<i>MB/AN</i>		<i>10-02-10</i>	
140  QC Quality Control	QC8- Inspect parts - second check  Memo	0.00  0.00		<i>L.P. 10/02/17</i>		<i>1</i>	<i>0</i>		
150  Crosstubes Crosstubes	Large Fab  Memo Grind machining marks.	0.00  0.00				<i>(IX)</i>		<i>MB 10-02-17</i>	

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Item Name: Crosstube Turning Detail

Start Date: 1/14/10 Start Qty: 1.00



Cust Item ID:

Required Date: 1/21/10 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
160 	Outsource process - Heat Treat	0.00							
Outsource1	<b>Memo</b>	0.00							
Outsource process - Heat Treat	Issue P/O: <u>11869</u> Heat Treat to min 180 KSI As per Dwg D350-748-241 Sand Blast tube after Heat Treat Possible Supplier: Vac Aero Ensure Certificate of Conformity is attached								<u>CZ</u> <u>10/5/11</u> <u>①</u>
170 	Receive & Inspect for Damage & Mat'l Certs	0.00							
Packaging	<b>Memo</b>	0.00							
Packaging	Ensure certificate of conformaty is attached								<u>P. 11/10/26</u> <u>④</u>
180 	QC6- Inspect dimensions to drawing	0.00							
QC	<b>Memo</b>	0.00							
Quality Control									<u>④</u>

S. Solosloz

**Work Order ID 55374**

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Cust Item ID:

Required Date: 1/21/10 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
190 	Packaging	0.00							
Packaging	Memo	0.00							
Packaging	Identify and stock in kanban rack Location: <i>X-tubes</i>								
			<i>10-5-27</i>						
200 	QC21- Final Inspection - Work Order Release	0.00							
QC	Memo	0.00							
Quality Control									

*10/05/28*  
*mk*  
*10-5-27*

# Picklist Print

Page 1

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Work Order ID: 55374



Parent Item: D350-748-241TRN



Parent Item Name: Crosstube Turning Detail

Start Date: 1/14/10

Required Date: 1/21/10

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
 IPP Rev B Removed polish 08.04.02 EC verified by : DD  
 IPP Rev C Removed LPS-3 08.06.23 Ec verified by: DD

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
D6018-125		Manufactured	No			120	Each	54.0000	1.0000			



Crosstube Material



Jan 10 02:07

Warehouse Loc Qty Loc Code

Location

Main Warehouse

LG 54

27472 6

32913 48

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	55374
<b>Description:</b> Crosstube Assembly (AS350/355 High Aft)		<b>Part Number:</b>	D350-748-241
<b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> D		<b>Page 1 of 1</b>	

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.242	✓			
	2.180	+0.005/-0.000	2.184	✓			
	2.180	+0.005/-0.000	2.185	✓			
	2.208	+0.005/-0.000	2.212	✓			
	2.234	+0.005/-0.000	2.238	✓			
	2.253	+0.005/-0.000	2.256	✓			
	2.272	+0.005/-0.000	2.276	✓			
	2.299	+0.005/-0.000	2.302	✓			
	0.063	+/-0.010	0.067	✓			
	4.26	+/-0.030	4.284	✓			
	R0.063	+/-0.010	R 0.063	✓			
	R0.50	+/-0.030	R 0.50	✓			
SIDE B	2.240	+0.005/-0.000	2.241	✓			
	2.180	+0.005/-0.000	2.185	✓			
	2.180	+0.005/-0.000	2.183	✓			
	2.208	+0.005/-0.000	2.208	✓			
	2.234	+0.005/-0.000	2.237	✓			
	2.253	+0.005/-0.000	2.255	✓			
	2.272	+0.005/-0.000	2.277	✓			
	2.299	+0.005/-0.000	2.302	✓			
	0.063	+/-0.010	0.066	✓			
	4.26	+/-0.030	4.285	✓			
	R0.063	+/-0.010	R0.063	✓			
	R0.50	+/-0.030	R0.50	✓			
	122.70	+/-0.060	122.730	✓			

<b>Measured by:</b> <i>AWM / MSB</i>	<b>Audited by:</b> <i>LS</i>	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 10-02-10	<b>Date:</b> 10/02/17	<b>Date:</b>	N/A

<b>Rev</b>	<b>Date</b>	<b>Change</b>	<b>Revised by</b>	<b>Approved</b>
A	07.01.17	New Issue (P/O D350-748-201)	KJ/JLM	

Item	Qty -241	Part Number	Description
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6018-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

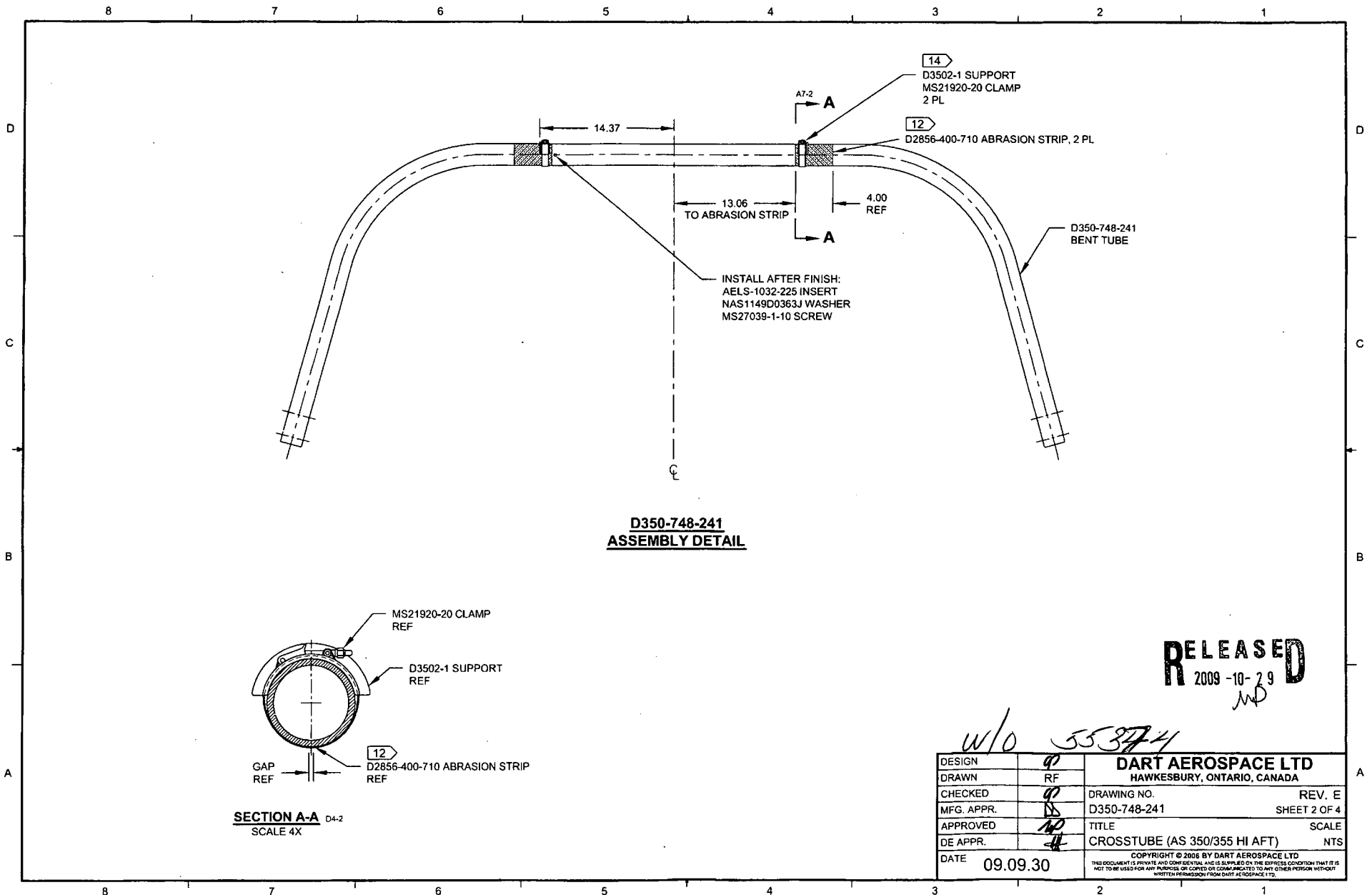
#### GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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WORK ORDER  
NO. 35374  
*Bl 10-144*

**RELEASED**  
2009-10-29  
*MD*

E	REVISE GENERAL NOTES; UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>qp</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	<i>qp</i>	DRAWING NO.	REV. E
MFG. APPR.	<i>IS</i>	D350-748-241	SHEET 1 OF 4
APPROVED	<i>qp</i>	TITLE	SCALE
DE APPR.	<i>qp</i>	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COMES OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

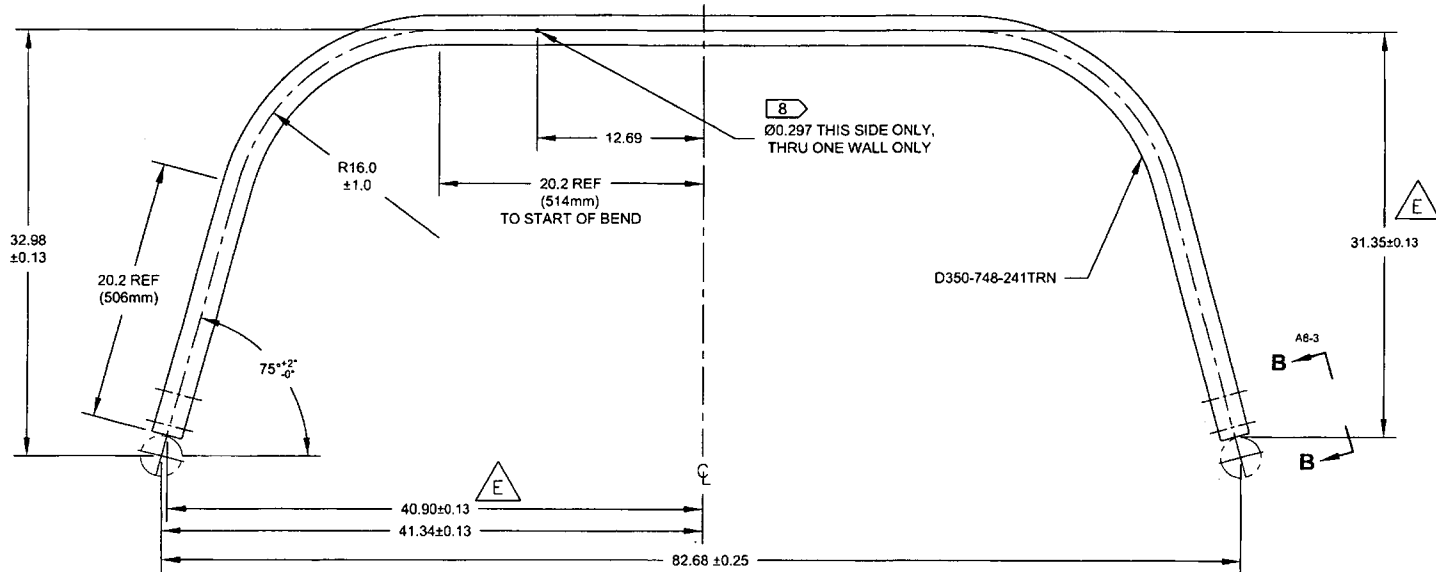


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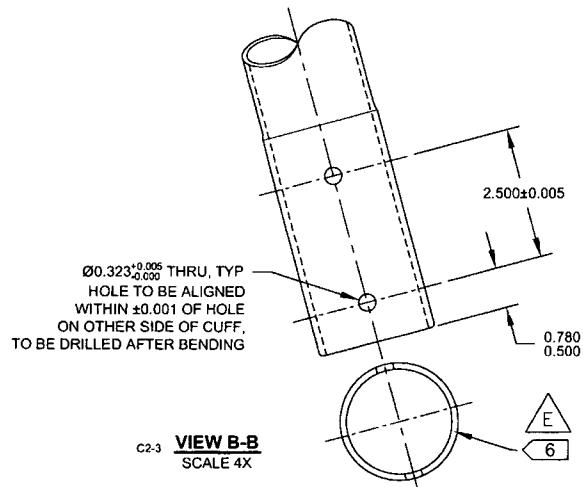
W/O 55374

DESIGN	90	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	90	DRAWING NO.	REV. E
MFG. APPR.	18	D350-748-241	SHEET 2 OF 4
APPROVED	10	TITLE	SCALE
DE APPR.	11	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	



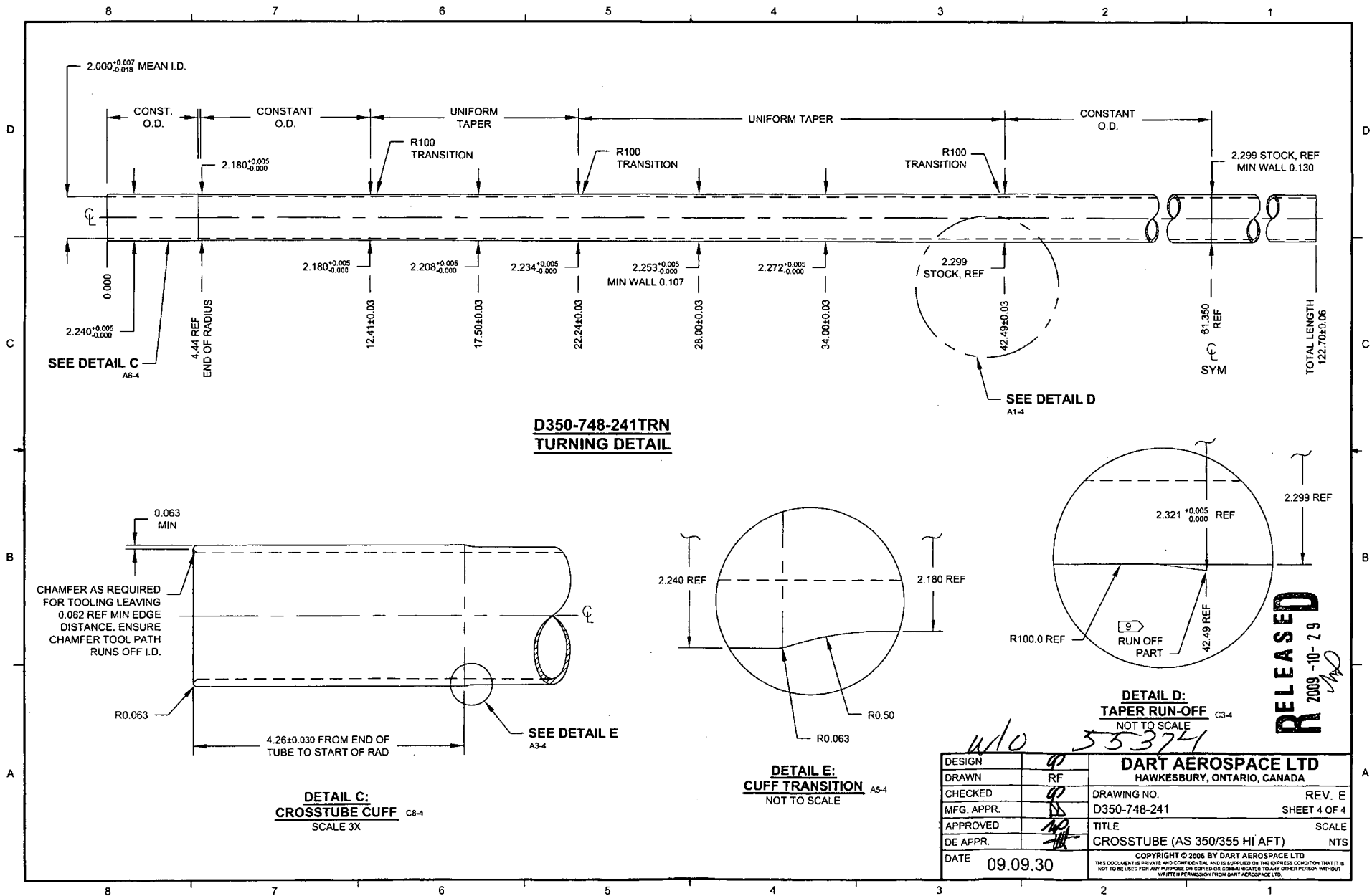


**D350-748-241**  
**BENDING AND DRILLING DETAIL** [10]



**RELEASED**  
 2009-10-29

DESIGN	RF	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-241	SHEET 3 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
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VAC AERO  
INTERNATIONAL INC.

RELEASE NOTE

GST No.: R105468102

OAK 119552-1

☒ HEAD OFFICE  
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CANADA L6L 2X5  
TEL: (905) 827-4171 FAX: (905) 827-7489

☐ 2009 WYECROFT ROAD, UNIT B  
OAKVILLE, ONTARIO  
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TEL: (905) 827-7377 FAX: (905) 827-1380

☐ QUEBEC DIVISION  
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC  
CANADA H4S 1C5  
TEL: (514) 334-4240 FAX: (514) 334-6269

05/19/2010

MM / DD / YYYY

PAGE: 1

1DAR01  
BILL TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
05/19/2010		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO11869		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
D350-748	-141 TRN CROSSTUBE	EA	12	12	
<p>Process Specifications: Procedure: 4353 HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1E 100% HARDNESS CHECKED AS PER ASTM E-18 40/45 HRC MATERIAL: 130 SAND BLASTED AFTER HEAT TREAT</p> <p>55294, 55295, 55296, 55297, 55298, 55299, 55300, 55301, 55372, 55373, 55374, 55375</p> <p>8 6060/27</p>					
<div>100% HARDNESS TESTED 12 pcs. 42/43 HRC</div> <div>VAL. Q. TH. 25 Q.C.</div>					

I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.



*Anna Robinson*  
Authorized Q.C. Inspector



VACUUM BRAZING · HEAT TREATING · SPECIAL PROCESSING · FURNACE EQUIPMENT  
TURBINE COMPONENT OVERHAUL · PLASMA AND OTHER COATINGS